



The Future of Hydrography

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Hydrography Defined

- “That branch of applied science which deals with the measurement and description of the physical features of the **navigable** portion of the Earth’s surface and adjoining coastal areas, with special reference to their use for the purpose of **navigation**.” IHO S32
- Note the emphasis on Navigation



Traditional Methods

- Analog data collection
- Data processing and smooth sheet production in the office
- Lengthy paper chart production process
- Manual chart updating procedures



Current Methods

- Digital data collection
 - Multi-mission ships and HSLs
 - HYCOOP/LIDAR/Fleet Survey Teams
- Field processing of data.
- In house data validation, digital production of ENC/DNC or hard copy product.
- Turn around time of data is vastly improved in the digital realm—but there is more data!



Revolution vs. Evolution

- Advanced positioning systems, high resolution bathymetry, airborne collection systems have all contributed to the advent of electronic charts for display within ECDIS.
- Are electronic charts truly revolutionary?
 - Still a navigation chart....in digital form.



The Real Revolution

- Real time integration of collected and/or modeled information into the navigational picture
 - Position, bathymetry, currents, tides, winds, seas, contacts, Notice to Mariners, bottom types, chemical properties, biologics, etc.
- Information, not charts, that is of use to more than just the mariner.



Hydrography Redefined

- “The total set of spatial data and information, and the applied science of its acquisition, maintaining and processing, necessary to describe the topographical, physical, and dynamical nature of the hydrosphere and its borders to the solid earth, and the associated facilities and structures.” H. Hecht, BSH



Future Methods

- Technology:
 - New platforms and sensors, high speed communications, improved software/hardware, better GPS techniques.
- Data Management:
 - Real-time data processing, integration, display.
 - New database structures (OO?).
 - Streamlined access for users.



Challenges

- A number of hydrographic issues must be resolved before this concept can be realized:
 - Tides: Insufficient real time monitoring and inadequate models exist for our largest source of depth error.
 - Vertical Datum: How to transition to an ellipsoidal height-based datum worldwide?
 - Kinematic GPS: Can we increase the range?
 - Databases: What is the best geospatial database structure? How do we make sure it is compatible with other environmental databases?



Required Investments

- People
 - Hydrography will require a highly specialized workforce that cannot be grown overnight.
 - Organizations need to commit to education & training and establish strong career paths.
- Research
 - Renewed commitment to R&D in both government and commercial sectors with efficient transition to operations.



Also Required...

- Strong support of hydrographic initiatives by maritime/naval organizations.
- Continued, and enhanced, coordination and sharing of knowledge/skill/technology between hydrographic offices worldwide.
- Increased cooperation between private sector and government agencies to develop a common geospatial data standards.
- Active participation in the development of National and International Spatial Data Infrastructures.



Examples

- Education & Research
 - NAVO/USM Hydrographic Center of Excellence
 - NOAA/UNH Joint Hydrographic Center
- Interagency Cooperation
 - NIMA/NAVO DNC Co-production
- International Cooperation
 - IHO/IMO/NATO Working Groups
- Private & Government Partnerships
 - USACE/SOALS
 - Digital Earth Project



Long Term

- Technology will continue to lead the way.
- Data holdings will become larger, more dense, more diverse, and more accurate--and more accessible.
- Hydrography will continue to provide data for safe navigation, but it will include significantly more information, usable by more applications, and available to more people than today.



Hydrography in Transition

- Hydrography is evolving from the traditional “charting science” to a fully integrated, geospatial discipline providing highly detailed information to a myriad of applications.



Battlespace Hydrography

- “The real-time collection, processing, and integration of hydrographic data from all available sensors into the 4-D Common Operating Picture.”